The
VETERINARY RECORD
Founded by William Hunting, F.R.C.V.S., in 1888
7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 5 FEBRUARY 4th, 1956 Vol. 68

Registered for Transmission as a Newspaper *Price 2s. post free*

Bovine Hydramnios and Hydrallantois

A Report of Five Cases Treated Surgically

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Introduction

THE pathological condition in the cow characterised by the development during the later stages of pregnancy of a grossly excessive volume of foetal fluids has long been known to veterinary clinicians. It is usually described as hydramnios. or hydrops amnii, although in four of the cases reported in this article the gross excess of fluid was, in fact, in the allantoic cavity. Wolfe & Rice (1952) also report that in their case it was the allantoic cavity which was involved. Craig (1918) states that the usual site of the excess fluid is the amniotic cavity, although the allantoic cavity may be involved also.

In this condition the maternal abdomen becomes progressively distended to a degree whereby the cow is unable to support her weight, and becomes recumbent. In some cases it is relieved by abortion or parturition. Craig, however, points out that uterine contractions are weak, and the cervix does not fully dilate, resulting in dystocia. The fact that the foetus is frequently abnormal adds a further complication to calving. Where the condition is not relieved spontaneously or by treatment the cow dies as an immediate result of her condition, or her slaughter is generally necessary consequent on prolonged recumbency.

The disease has been reported in many breeds; Scott (1896) in a Devon heifer, Lewis Green (1899) in a cross-bred Hereford, Spangler (1931) in a Holstein, Caldwell (1933) in a Shorthorn, Golledge (1942) in a Shorthorn, Wolfe & Rice (1952) in a Hereford, Richman (1952) and Burke *et al.* (1952) in Jerseys, Milne (1953) in a Guernsey and a Shorthorn, Pierson & Ingram (1953) in an Aberdeen Angus. Recurrent hydrops amnii is a frequent feature of the so-called bulldog pregnancy in the Dexter breed, but in this instance the membranes may rupture periodically during gestation with the evacuation of a large quantity of the excess fluid. Although none of the above references relate to the Ayrshire breed, the relatively high incidence of variable degrees of dropsy of the foetus and/or foetal membranes is becoming more and more apparent in this breed. Donald, Deas & Wilson (1952) have recorded data of 325 dropsical calves in 60 Ayrshire herds, some of which were associated with abnormal volumes of amniotic fluid, but more often the manifestation of the condition was the dropsical "bulldog" calf. From their studies of the breeding records of the animals affected they drew the conclusion that it is hereditary and due to a single autosmal recessive gene.

During the period November, 1949, to April, 1955, 12 cases of dropsy of the foetus and/or foetal membranes were referred by practitioners to the Field Station of the school for treatment. In five of these oedema was confined to the calf and the onset of parturition commenced naturally at term but the foetal abnormality provoked dystocia; three involved the Friesian breed while two were Ayrshires. In the remaining seven cases there was a grossly excessive volume of foetal fluid; four were Ayrshires, two Friesians, and one a Guernsey. In six of these there was marked oedema of the foetal membranes. Of the 10 calves, five were dropsical and/or exhibited marked renal abnormalities.

Treatment has long been recognised as difficult and problematical. Trocharisation of the distended uterus through the abdominal wall is an obvious line of treatment, but it is generally fatal as recorded by Scott (1896), Conisbee (1933), Caldwell (1933), and Williams (1943), unless the operation is promptly followed by abortion when the mother may live (Olver, 1933; Caldwell, 1933). Cases are recorded in which the animal has survived trocharisation but fatal re-distension has quickly occurred (Conisbee,

1933; Williams, 1943). Craig recommends progressive manual dilatation of the cervix and subsequent rupture of the membranes *via* this route. This is a difficult task but Lewis-Green (1899) records a case in which he was able to do this, but the cow died.

With the discovery that the injection of the synthetic oestrogenic substance stilboestrol dipropionate would at certain phases in bovine pregnancy provoke abortion, a trial of its use in the condition under review was clearly indicated, and Golledge (1942) recorded a case of a seven-and-a-half-year-old Shorthorn, seven and a half months pregnant, in which the injection of 25 mg. of stilboestrol dipropionate was followed 10 hours later by the expulsion of a large volume of fluid. Five weeks subsequent to this she aborted dead twin calves. Others, however, have found that stilboestrol fails to give relief. In two cases so treated here the drug was ineffective. In this connection it is probable that the effectiveness of stilboestrol in provoking abortion is closely related to the duration of gestation, for the experience, in this institution again, has been that its use is unlikely to provoke abortion in animals eight months or more pregnant. Milne (1953) has recorded the use of estradiolcyclopentylpropionate (E.C.P.) in two cases. In the first, a Guernsey six months pregnant, the cervix had sufficiently relaxed 48 hours after the administration of 8 mg. of the drug to allow of rupture of the membranes and progressive draining of the uterus, which was later followed by further relaxation of the cervix which allowed the withdrawal of the calf. In the second, a Shorthorn eight months pregnant, greater difficulty was experienced, but he was ultimately able to drain the uterus, and, after incision of the cervix, extract two calves.

It is the general belief that Caesarean section in these cases is associated with a high mortality rate. It is probable that the sudden fall in abdominal pressure consequent on the release of fluid during the operation is a major factor in the production of the shock-like syndrome which precedes death. However, cases of hydrops amnii successfully treated by Caesarean section have been recorded by Spangler (1931), Richman (1952) and Burke *et al.* (1952).

It would appear desirable to obtain gradual drainage of the uterus before embarking on Caesarean section, in order to avoid the sudden loss of fluid which accompanies the operation. Kealey (1951) successfully applied this principle in a case in a three-year-old Shorthorn heifer which was six to seven months pregnant. About half the foetal fluid was drawn off through a canula, after which Caesarean section was performed. The heifer made a good recovery. Wolfe & Rice (1952) describe a two phase method of surgical relief of hydrops amnii which was successfully performed on a 20-month-old Hereford heifer. They obtained slow removal of the foetal fluids by the insertion of a small bore drainage tube in the uterus. On the following day, left flank Caesarean section was performed. The placenta was removed manually 96 hours after the operation, after which recovery was uneventful.

Pierson & Ingram (1953) successfully performed a similar operation on an aged Aberdeen Angus cow.

Of the seven cases of "hydrops" admitted to this hospital for treatment, one, a six-year-old Ayrshire cow gravid seven months with twins, was treated by Caesarean section and died 24 hours later. This case has been described elsewhere by Wright (1953). Another, a six-year-old Friesian, calved dead twin calves shortly after arrival at the hospital, but died a week later. Both calves were normal. Five consecutive cases have been successfully treated by a modification of the technique of Wolfe & Rice. It is these five cases which form the subject of this communication.

CASE REPORTS

Case 1

Subject.—A two-year-old Ayrshire heifer.

History.—The heifer was served seven months before admission to the hospital. During the last month distension of the abdomen had become obviously abnormal causing the owner to seek professional advice.

Examination.—The heifer was bright, and her appetite was good, but she was very weak. Bodily condition appeared to be moderately good, temperature was 101°, pulse rate 88. She could rise to her feet from the recumbent position without assistance, but had difficulty in doing so. On rectal examination a huge distended uterus could be felt, but the foetus could not be located by palpation or ballottement.

Treatment.—Twenty-five mg. of stilboestrol dipropionate were injected intramuscularly on the day following admittance. For the next four days the heifer was kept under observation but no effect was noted. A second similar injection was given on the fourth day, again without noticeable effect. The heifer's condition was now causing her distress and it was decided to attempt to relieve the condition by surgical interference.

Operation

The first phase of the operation was performed one week after admittance.

(a) *Insertion of drainage tube*

This was performed in the standing position under local anaesthesia. Before the operation 1 oz. of chloral hydrate was administered *per os* as a sedative. An area 18 by 18 inches in the left flank was shaved, thoroughly cleansed with soap and water, and dressed with surgical spirit. The area was surrounded by sterile rubber sheets which were clipped in position. The skin and underlying muscles of the operation site were infiltrated with 2.25 per cent. procaine hydrochloride. A vertical skin incision 4 inches in length was made, its lower commissure being situated about 4 inches above the anterior extremity of the fold of the flank. The underlying muscles were then incised. The length of the muscle incision was progressively reduced in the deeper layers, the deepest layer being incised for a length of only 2 inches. Haemorrhage was slight and easily controlled by clamping bleeding vessels. The peritoneum was incised with

straight scissors. Immediately underlying the peritoneum was the distended uterus.

The drainage appliance consisted of a 6-inch length of ¼-inch glass tubing to which was attached an 18-inch length of rubber tubing. The end of the glass tube was introduced into the incision and by firm pressure thrust through the uterine wall. A further thrust was necessary to pierce the allanto-chorionic membrane. Fluid then commenced to run freely from the drainage tube. The whole length of the glass tube, and about 3 inches of the rubber tube, were passed into the uterus. Two catgut sutures passing through the uterine wall and the rubber tubing served to secure the drain in position. The abdominal incision was then closed using interrupted No. 4 catgut sutures for the peritoneum and muscles, and interrupted No. 4 silk sutures for the skin. About a foot of the rubber drain was left hanging freely from the wound.

Foetal fluid drained away at a brisk rate for 45 minutes or so. Thereafter the rate of flow became greatly reduced, and frequently ceased altogether for a short period, presumably due to occlusion of the uterine end of the tube by foetal membranes or by the foetus itself. The flow recommenced following movement of the cow or the foetus. A measured 30 gallons of fluid were drained away within three hours of the operation, after which time the amount of escaping fluid was not measured.

For the next 24 hours the heifer was bright and ate well. Her temperature rose to 103·4° and her pulse remained at the pre-operative level of 88.

It was observed that about 4 inches of the drainage tube which had been hanging from the incision had been drawn into the abdomen owing to contraction of the uterus.

(b) *Caesarean section*

The foetus was removed by Caesarean section 24 hours after the drainage operation. The heifer was cast on to a straw bed and restrained on her right side. Light anaesthesia was induced by the slow intravenous injection of 40 g. chloral hydrate in 10 per cent. solution.

After preparing the operation site in the usual manner, and infiltrating with local anaesthetic, the existing incision was extended dorsally and ventrally so that its total length was 10 inches. The uterus was grasped and the portion pierced by the drainage tube was drawn out of the wound. The drain was removed. Commencing at the puncture made by the drain the uterus was incised over a length of 9 inches using a pair of straight scissors. The foetus, around which the amnion was closely applied, was located, and its head and fore-limbs roped. By gentle traction, head, fore-limbs and thorax were easily drawn out of the uterus, but beyond this no progress could be made owing to the fact that the foetal abdomen was grossly distended with fluid. A 3-inch incision was made in the foetal abdomen, releasing an estimated three gallons of fluid. The foetus was then easily removed. The foetal membranes, which were oedematous, were very firmly attached and could not be removed. They were therefore left *in situ*.

The uterine wound was closed with a continuous Lembert catgut suture. Five megaunits penicillin were injected into the abdominal cavity. The abdominal wound was closed in the manner previously described. Before suturing the skin, the muscles were dressed with penicillin ointment.

Immediately after completion of the operation 1,000 ml. of a 6 per cent. dextran solution were administered intravenously, and 5 megaunits penicillin were injected intramuscularly.

Post-operative Course

It was clear after the operation that the heifer was in very poor physical condition—a fact which had largely been masked prior to operation by the great distension of the abdomen. Her abdomen was now extremely flaccid and pendulous in appearance.

The post-operative course was satisfactory for the first two days. It was noticed that the heifer spent a lot of her time licking at the walls of the loose-box, her manger, and in particular any vulval discharges on the floor of the loose-box. It was thought that she might be suffering from a salt lack, and accordingly a 4½ lb. salt lick was placed in her manger. This she licked most eagerly, and even attempted to bite lumps off it. Within four days the lick had been completely consumed, and was replaced by another. By this time, however, her craving for salt was largely satisfied, and she showed only occasional interest in the second lick.

On the third day the heifer became dull, refused all food and commenced to scour profusely. Her temperature rose to 104° F. and her pulse rate to 110. The cervix was at this stage widely dilated, but the foetal membranes were still firmly attached. Forcible removal was not attempted. For three days the heifer was very ill. She was treated with daily injections of 5 megaunits penicillin and 5 g. streptomycin, and injections of glucose saline to combat dehydration. By the sixth post-operative day she was brighter and had commenced to eat, and thereafter her condition slowly but steadily improved. The placenta was finally expelled on the tenth post-operative day. Healing of the operation wound was retarded by the formation of a large suture abscess. The heifer was discharged 23 days after the operation. At no time was there any appreciable quantity of milk in her mammary gland.

Three months after her discharge the owner's veterinary surgeon reported that she had made an excellent recovery and was rapidly putting on flesh.

Post-mortem Examination of the Calf

The weight of the foetus, which was a male, was 50 lb. It was devoid of hair except about the muzzle. There was a moderate degree of anasarca, but there were no gross anatomical abnormalities such as are seen in bull-dog calves.

The abdominal cavity, which before puncture had been distended with ascitic fluid, was exceptionally capacious. There was gross retroperitonial oedema. The capsule of the right kidney was oedematous measuring about ¼ inch in thickness. The right kidney measured 6½ by 4 inches. It was pale and saturated

with fluid. Section of the kidney revealed multiple cysts varying in size from ¼ cm. to 2 cm. in diameter. The left kidney showed no macroscopical abnormality. The remainder of the abdominal viscera were macroscopically normal.

The pathologist's report on the right kidney was as follows:—

"Histologically the cystic spaces were observed to be lined by a transitional epithelium, in some places only one cell thick. The surrounding medullary tissue was oedematous, and appeared to contain very few uriniferous tubules in some areas. There was marked capillary congestion. The cortical zone showed evidence of normal foetal development, but many of the glomerular spaces and uriniferous tubules were dilated, presumably the result of hydrostatic pressure. The cortex and medulla as a whole were somewhat compressed.

"The condition appears to be a cystic dilatation of the calyces, the terminal branches being blind instead of communicating with the ureter."

Case 2

Subject.—A five-year-old attested Ayrshire cow.

History.—Distension of the abdomen had first been noticed three months before the estimated date of calving. Veterinary advice was not sought until the cow became recumbent and unable to rise, eight and a half months after service.

Examination.—The cow was recumbent. Her bodily condition was very poor, though she had a fair appetite. Temperature was 102.2° and pulse 92. There was enormous bilateral distension of the abdomen. A diagnosis of "hydrops" was confirmed on rectal examination. It was decided to operate immediately, but a very poor prognosis was given because of her very weak condition.

Examination of her blood gave the following results:—

Total Red Cell count	...	4,620,000 per cu. mm.
Total White Cell count	...	17,900 per cu. mm.
Differential White Cell count—Bands		4·0
Polymorphs		63·5
Lymphocytes		27·5
Monocytes		5·0
Eosinophils		Nil
Basophils		Nil

Operation

(a) *Drainage operation*

The procedure adopted was basically the same as in Case 1. However, a modification was introduced in an attempt to prevent part of the drainage tube exposed to the air from being drawn into the abdominal cavity by the contracting uterus. In this case the uterus was sutured to the peritoneal and muscular edges of the abdominal wound and the drainage tube was fixed in position by suturing it to the skin edges of the wound. Approximately 35 gallons of fluid were drained from the uterus within the next three hours. At this point drainage ceased. On examination the drainage tube could be felt through the abdominal wall and from its position it was evident that the uterus must have contracted away from the abdominal wound in spite of the fixing sutures, and that the drainage tube was now lying in the abdominal cavity. Under local anaesthesia the wound was reopened, the tube reinserted into the uterus and sutured to the uterine wall. The sutures fixing the the tube to the abdominal wall were removed. The abdominal wound was then closed. Drainage of the uterus then recommenced.

On the following day the cow was bright, could get to her feet without assistance, and had a good appetite.

(b) *Caesarean section*

This operation was carried out as described in Case 1. Only 25 g. of chloral hydrate given intravenously were sufficient to produce adequate narcosis. During the operation it was again noted that the pathological accumulation of fluid was in the allantoic cavity, the amniotic sac being of about normal capacity. The foetal membranes were very oedematous. A live heifer calf was delivered without difficulty. After the completion of the operation 1,000 ml. of 6 per cent. dextran solution were given intravenously and 5 megaunits of penicillin and 10 ml. of a 5 per cent. solution of promezathine hydrochloride were injected intramuscularly. The calf died five minutes after it was removed from the uterus.

Post-operative Course

Although it was realised before the operation that the cow was in poor condition, her greatly distended abdomen masked to some degree the fact that she was in a state of severe emaciation. This, however, became very apparent following evacuation of the uterus. As in the previous case, her abdomen was strikingly flaccid and pendulous. She was in addition extremely weak and unsteady on her hind legs. However, on the first post-operative day she was moderately bright and had a fair appetite. In contrast to the previous case she showed no marked craving for salt. Her temperature was 103° and her pulse 100. There was a slight sanguinous vaginal discharge. Five megaunits of penicillin and 5 g. of streptomycin were injected intramuscularly. For the following three days her condition deteriorated. Her temperature varied between 104° and 104.5° and her pulse rate remained constant at 84. Her appetite was fair. Treatment with penicillin and streptomycin was continued. Vaginal examination revealed a dilated cervix. The foetal membranes were firmly attached to the maternal cotyledons. Forcible removal of the membranes was not attempted, but 1 megaunit of penicillin and 1 g. of streptomycin were placed in the uterus each day.

From the fifth post-operative day the cow's condition steadily improved. Her temperature and pulse rate fell to normal, her appetite improved, and her strength quickly returned. Her bodily condition, however, was still extremely poor. The operation wound healed by first intention except for the formation of a single small suture abscess near the lower commissure. The slight vaginal discharge continued

but the foetal membranes remained undetached. Her milk yield was nil throughout the post-operative course. She was discharged on the 16th post-operative day.

Six months later her veterinary surgeon reported that the cow had cleansed a few days after she was discharged from the hospital. A slight uterine discharge persisted for a few weeks during which time she rapidly improved in condition. She was served three months after the operation. Subsequent rectal examination on two occasions confirmed that she was pregnant. At the time of writing she is four months in calf.

Post-mortem examination of the calf

The calf was a heifer weighing 60 lb. Except for slight distension of the abdomen it was normal in appearance. There was no anasarca, nor was there any excess fluid in the peritoneal cavity. The distension of the abdomen was due to the pathological enlargement of the kidneys which were of equal size. They measured 6 inches from pole to pole and 5 inches in diameter. They were pale in colour and contained multiple cysts about ½ inch in diameter.

Histologically the cystic spaces were again found to be the dilated extremities of the calyces, lined by a somewhat degenerate transitional epithelium. There was very little medulla, merely a thin layer of loose oedematous tissue containing a few collecting tubules. Apart from dilatation of many of the uriniferous tubules the cortical zone appeared to be normal for the age of the foetus.

The liver was pale and enlarged. Near the gall bladder there was a bladder-like cyst about 1½ inches in diameter containing honey-coloured fluid. The remainder of the abdominal viscera were macroscopically normal. The contents of the thorax showed no macroscopic abnormality.

Case 3

Subject.—An attested Ayrshire cow.

History.—The cow had been purchased a few months previously in the open market. Her age and the date at which she was last served were unknown. Distension of the abdomen was first noticed about a month before veterinary advice was sought.

Examination.—The cow appeared bright and in moderate condition. Her appetite was good. There was marked bilateral distension of the abdomen but she could walk and get up and down without undue effort. Rectal examination confirmed a diagnosis of "hydrops."

The cow's blood picture was:—

Total Red Cell count ...	4,820,000 per cu. mm.	
Total White Cell count ...	9,850 ,,	,,
Differential White Cell count—Bands		3·0
Polymorphs		47·0
Lymphocytes		42·0
Monocytes		7·0
Eosinophils		0·5
Basophils		0·5

Operation

(a) *Drainage operation*

The procedure adopted was the same as in Case 1. The operation was uncomplicated and a very large volume of fluid was drained from the uterus. The volume of fluid was not measured. Immediately after completion of the drainage operation 1,000 ml. of a 6 per cent. dextran solution were administered intravenously and 5 megaunits of penicillin intramuscularly.

The cow appeared to be virtually unaffected by the operation and ate well for the remainder of the day. On the following morning it was observed that the rubber drain was no longer hanging from the operation wound. It was presumed that it had been drawn into the abdomen by the contraction of the uterus. The cow's condition was still very satisfactory, her pulse and temperature being 88 and 101.8° respectively.

(b) *Caesarean section*

Caesarean section was performed 20 hours after the drainage operation. The cow was cast and light anaesthesia induced by the intravenous injection of 450 ml. of a 10 per cent. chloral hydrate solution. The operation was performed in the manner already described. The drain was located in the abdomen, still attached to the uterus. Once again it was observed that the pathological accumulation of fluids had been contained in the allantoic sac and not in the amnion. The calf occupied the right horn of the uterus. So great was the volume of the uterus that the operator could barely touch the amnion with his finger-tips, even with his arm inserted to its full extent into the uterus. The allanto-chorion was very oedematous, being 3 inches thick in some places. It was very easily detached from the maternal cotyledons. Gentle traction on this membrane not only served to detach it from its uterine attachments, but also brought the calf, enveloped in the amnion, within easy reach of the operator's hand. The amnion was punctured and the calf's hind limbs roped. As in Case 1 there was great distension of the calf's abdomen with ascitic fluid, and the abdomen had to be punctured to allow this fluid to escape before the calf could be removed from the uterus. The foetal membranes were completely removed from the uterus. The operation was then completed in the usual manner. Immediately after the operation 5 megaunits of penicillin and 5 g. of streptomycin were given intramuscularly.

Post-operative course

On the day following the operation the cow's temperature was 102°, and her pulse 112. She was bright, ate quite well, and yielded 6 lb. of milk. Her faeces were normal. There was a slight sticky vaginal discharge which was probably the liquefied cervical seal. Injections of 5 megaunits of penicillin and 5 g. streptomycin were given for two days, after which time treatment was discontinued. Her recovery was rapid. By the third day her pulse and temperature were normal and she was eating and ruminating normally. The operation wound healed by first inten-

tion. She was discharged on the 10th day, by which time her milk yield had risen to 21 lb. a day.

Post-mortem examination of the calf

The calf, which was a male, appeared to be of about 8½ months' development. It was a typical bulldog calf. Its weight was 65 lb. There was extensive anasarca. The abdomen had been severely distended with fluid, but this had been drained away to facilitate removal of the foetus from the uterus during the operation. Of the abdominal contents the liver, spleen and intestines were macroscopically normal in appearance; the kidneys, however, were markedly abnormal. They were of equal size, measuring 6 inches in length and 3 inches in diameter. In colour they were a deep mahogany brown. They were extremely flabby and both contained numerous thin-walled cysts, the majority of which were ½ to ¾ inch in diameter. The cysts contained a port-wine coloured fluid. The thoracic contents were normal in appearance. Unfortunately owing to an oversight a histological examination of the kidneys was not made.

Case 4

Subject.—A six-year-old attested Friesian cow.

History.—Abnormal distension of the abdomen was first noticed at the 30th week of gestation. A fortnight later she became dull and lost her appetite. She tended to lie down a lot, and had difficulty in rising. At this stage she was admitted to this hospital for treatment.

Examination.—The cow was in fairly good physical condition. There was marked bilateral distension of the abdomen. Her temperature was 102.5° and her pulse 120. A diagnosis of "hydrops" was confirmed by rectal examination.

Her blood picture was as follows:—

Total Red Cell count	...	4,800,000 per cu. mm.
Total White Cell count	...	14,750 per cu. mm.
Differential White Cell count—		
Bands		3 per cent.
Polymorphs		58 " "
Lymphocytes		34·5 " "
Monocytes		4·5 " "
Eosinophils		Nil
Basophils		Nil

Analysis of the amniotic fluid removed at operation gave the following results:—

Sodium	315 mg. per cent.
Chloride	340 " " "
Potassium	25 " " "

Operation

(a) *Drainage operation*

The principle of this operation was the same as in Cases 1, 2 and 3. However, another modification was introduced in order to prevent withdrawal of the drainage tube into the abdomen from outside the cow's body. The tube used was 3 feet in length, and to one end of it was attached a glass tube as in the previous operations. Four holes, about ¼ inch in diameter and 1 inch apart, were cut in the wall of the tubing near its junction with the glass tube. This ensured that should the end of the glass tube become occluded drainage would not be interrupted. About 2 feet of tubing was inserted into the uterus. A purse-string suture around the tubing served to prevent leakage of fluid from the puncture. The abdominal muscles and the skin incision were sutured in the usual manner, and the tubing was anchored to the skin edges of the wound by two silk sutures, thus preventing withdrawal of the tube into the abdominal cavity. It was thought that the tubing in the uterus would be of sufficient length to ensure that the uterus did not contract right away from it. Fluid drained away at a brisk rate for about two and a half hours, by which time 33 gallons had been measured. By this time the rate of flow was very slow, and the small amount of fluid which subsequently drained away was not measured.

The cow appeared much relieved by the operation and the following morning was bright and had a good appetite, but had commenced to scour profusely.

(b) *Caesarean section*

Anaesthesia was induced by the intravenous injection of 50 g. chloral hydrate. On opening the abdomen it was seen that the uterus had drawn right away from the drainage tube which was lying freely in the abdomen. The tube was removed, and the operation proceeded with in the usual manner. Live twin calves were removed from the uterus without difficulty. The oedematous foetal membranes were firmly attached and could not be removed at operation. The uterus was closed and the abdominal wound sutured as in the previous cases. Five megaunits of penicillin were injected into the abdominal cavity before closure of the incisions. A further 5 megaunits of penicillin were injected intramuscularly immediately after the operation was completed.

This was a case of true hydramnios, for it was the amniotic sac of the calf in the left cornu which contained the pathological accumulation of fluid. The second calf was situated in the right cornu and its amniotic sac was of normal size.

Both calves were alive at birth, though in a narcotic state. The calf which had occupied the left cornu was a female. Its legs were severely distorted due to congenital tendon contraction. No effort was made to revive this calf, which died about five minutes after birth. The second calf, which was a male, appeared to be anatomically normal except for a very slight deformity of the ears. This calf recovered from the effects of the anaesthetic but was extremely weak and quite unable to stand. In spite of frequent bottle feeding and two blood transfusions it died two days after birth. Neither calf exhibited any abnormality of the thoracic or abdominal viscera at *post-mortem* examination.

Post-operative course

The cow was rather dull and scouring rather badly for the first two days after the operation. By the third day she was much brighter, had a good appetite and her faeces were normal, but extensive

subcutaneous emphysema had developed which involved the neck, the back and the walls of the chest and abdomen. The emphysema persisted until the cow was discharged, although by that time it was very much reduced in severity and extent.

The cow was injected with 5 megaunits of penicillin for the first three post-operative days, by which time she was bright, had a good appetite and her temperature and pulse were normal. Her subsequent recovery was rapid.

The foetal membranes in the left cornu were expelled on the fifth day, but those occupying the right cornu were retained until the 15th day. A penicillin/streptomycin pessary was inserted into the uterus daily from the second to the seventh day, but apart from this the uterus and membranes were not interfered with in any way.

The cow exhibited a marked craving for salt after the operation, and consumed a 4½-lb. brick in two days. A second brick lasted six days. By this time she appeared to have satisfied her craving, for a third brick was licked only occasionally. Her milk yield rose from 5 lb. on the day after the operation to 20 lb. on the day of her discharge.

The skin sutures were removed on the seventh day, and she was then turned out to pasture where she grazed contentedly until her discharge 21 days after the operation.

Case 5

Subject.—A four-year-old attested Guernsey cow.

History.—The cow had been served six months prior to admission to the Field Station. The abnormal distension of her abdomen was first noticed about five months after service.

Examination.—There was considerable bilateral distension of the cow's abdomen. She was moderately bright, and had a fairly good appetite. Her pulse was 104 and her temperature 101.2°, and her respiratory rate 45 per minute. Her bodily condition was very poor, she was rather weak, and had difficulty in rising from the recumbent position.

Examination of her blood before operation gave the following results:—

Total White Cell count	... 16,050 per cu. mm.	
Differential White Cell count—		
	Bands	2 per cent.
	Polymorphs	55 „ „
	Lymphocytes	36·5 „ „
	Monocytes	5 „ „
	Eosinophils	1 „ „
	Basophils	0·5 „ „
Total Red Cell count	... 5,140,000 per cu. mm.	

The levels of sodium and potassium in samples of blood serum obtained before drainage of the uterus, and five days after drainage were estimated. Similar estimations were carried out on the allantoic fluid removed at operation.

Results	*Sodium*	*Potassium*
Serum (pre-operative)	400 mg. per cent.	23·0 mg. per cent.
Serum (post-operative)	380 mg. „ „	14·0 mg. „ „
Allantoic fluid	320 mg. „ „	54·5 mg. „ „

Operation

(a) *Drainage operation*

The method used was the same as in Case 4, except in that the length of tubing inserted into the uterus was increased to 3 feet. The operation was uncomplicated and 26 gallons of fluid were removed. When drainage was complete the emaciated condition of the cow was most striking. She was much relieved by the operation and her pulse fell overnight from the pre-operative level of 104 to 72.

(b) *Caesarean section*

This operation was performed in the usual manner. Adequate anaesthesia was provided by the intravenous injection of 40 g. chloral hydrate. On opening the abdomen it was observed that the drainage tube was still *in situ* in the uterus. A live heifer calf was removed from the uterus. The calf was closely enveloped in the amnion, the pathological volume of fluid having been in the allantoic cavity. The foetal membranes were not oedematous. They were firmly attached to the maternal cotyledons and no attempt was made to remove them forcibly. The operation was completed in the usual manner.

Post-operative course

The cow commenced to scour profusely within six hours of the operation, but ate fairly well for the first 24 hours. For the next three days her condition rapidly worsened. She refused all food, and was recumbent most of the time. Her eyes were sunken, and there was a slight respiratory moan. Her temperature was 103.8° and her pulse 100 During this time she was treated with 5 megaunits penicillin and 5 g. streptomycin daily, she also received subcutaneous injections of glucose saline to combat dehydration. On the fifth day there was a marked improvement. Her temperature fell to 101.3° and her pulse to 80. Her faeces became firmer and she commenced to eat. Thereafter her recovery was uneventful and rapid.

Within 24 hours of the operation foetal membranes were hanging from her vulva. Vaginal examination revealed that the cervix was dilated about 5 inches. About half the placenta was expelled on the second day, but the remainder was retained until the seventh day. During the period of placental retention two penicillin/streptomycin pessaries were inserted into the uterus daily.

When admitted to the Field Station the cow was giving only a few pounds of milk a day. After operation her yield rapidly dropped to zero and was not restored even after she had fully recovered.

At no time did she exhibit any craving for salt. Although a salt lick was placed in her manger, it was virtually untouched.

On the seventh day she was turned out to grass and she was discharged on the 14th day.

Post-mortem examination of the calf

The calf, which was a heifer, was alive at birth but died within five minutes. It weighed 29 lb. *Post-mortem* examination revealed no macroscopic abnormality, except for a slight dilatation of the pelvis of both kidneys.

The pathologist's report on the kidneys was as follows: " Histological examination of the kidneys showed a normal cortex. The medulla showed dilated collecting tubules and variable oedema of the intertubular tissue. The calyces were dilated, in those most markedly affected the epithelium was reduced to a single layer of very flattened cells.

" These findings indicate a degree of hydronephrosis, which is presumably due to an obstruction to the flow of urine from the kidney."

DISCUSSION

The object of performing the two-phase operation was to avoid the shock occasioned by the sudden loss of fluid which necessarily accompanies conventional Caesarean section in this condition. Although in the cases described most of the fluid was drained away within the first three hours, Caesarean section was not performed until some 20 hours later. This delay allowed time for the cow to recover to a considerable extent from the effects of the fluid loss, and she was thus better able to withstand the second operation.

Technically both operations were relatively easy; the drain was inserted in a matter of 15 minutes or so and the subsequent removal of the foetus was also straightforward. Only two difficulties were experienced in the cases under review; the first was gross distension of the foetal abdomen which necessitated release of the ascitic fluid before delivery could be effected. This occurred in two cases. The second, which occurred in one case, was difficulty in locating the foetus which occupied the distal horn of the uterus. Had this foetus been one of bicornual twins it is possible it would have been overlooked.

It will be noted that three differing techniques were used for the drainage operation. That employed in the first and third cases had the disadvantage that the contracting uterus tended to draw the tube into the abdominal cavity. In the second case an attempt was made to anchor the uterus to the abdominal wall, but this failed and the end result was the same as previously. The method adopted in Cases 4 and 5 in which the drainage tube was anchored to the abdominal wall was the most satisfactory.

A striking feature of all cases was the flaccidity and pendulous nature of the abdomen after operation due, no doubt, to the stretching and loss of tone of the abdominal muscles during the period of distension. Several days elapsed before the abdomen assumed a normal appearance.

Three of the cases developed scouring after the operation; in Case 1 it commenced two days after removal of the foetus and marked the onset of systemic ill health. It was probably ascribable in this case to a degree of post-operative peritonitis. In Cases 4 and 5 diarrhoea was a very early post-operative feature. In the former it was unassociated with systemic illness, and in the latter it was unaccompanied by other symptoms until some 24 hours after onset. Its cause in these two cases remains unexplained.

In all cases the uterine cervix had relaxed to a degree sufficient to admit the hand within 48 hours of removal of the foetus. Retention of the placenta occurred in four, the exception being Case 3 in which the foetal membranes were entirely removed at operation. Placental retention is to be expected in an operation of this nature which is performed weeks or even months before term. It is probable that inertia of the uterine musculature consequent on its extreme stretching contributes to the retention.

A feature of the post-operative course of Cases 2 and 4 was a marked craving for salt. Milne (1953) made a similar observation. No estimations were made of the blood serum sodium levels but the sodium content of the foetal fluid in Case 4 was 315 mg. per cent., and if it is taken that the uterus contained 40 gallons of fluid, this represents a total sodium of 570 g. (about 1¼ lb.). Whether the deprivation of the maternal body fluids of this quantity of sodium over the time taken for the foetal fluids to collect could be the reason for the salt craving is impossible to say in the absence of an accurate knowledge of the daily intake and excretion of sodium over this period. Whilst enquiry showed that neither cow had access to a salt lick during pregnancy, the same applied to Cases 3 and 5 which exhibited no craving for salt after the operation.

An important consideration in the economy of the operation is the animal's subsequent breeding ability. Information has so far been obtained in relation to the first three cases only. No attempt was made to breed from Case 1 which was fattened for slaughter; Case 3 came into heat regularly, but failed to conceive to repeated service and was disposed of after a satisfactory lactation; Case 2 was served three months after operation and conceived to that service. A further consideration is whether or not the operation is succeeded by lactation. This will be influenced by two factors (a) the time in gestation at which the operation is performed and (b) if the animal is lactating from the previous parturition. In three cases operation was performed during the last month of pregnancy, in two of these the operation was followed by a satisfactory lactation. In the remaining two cases operation was performed in the sixth and seventh month of pregnancy respectively; neither of these subsequently yielded an appreciable quantity of milk.

In Table I a summary is made of certain features of the five cases already described, and of two other cases of " hydrops " which were admitted to the Field Station or treatment and subsequently died, one (Case 6) after conventional Caesarean section, the other (Case 7) after calving. Despite the small number of cases, certain points of interest arise from a study of the table.

(a) *Breed incidence*

Of the cattle population from which the Field Station draws its material, Friesians predominate,

TABLE I

Case	Breed	Sex of Calf	Foetal abnormality	Placenta	Nature of condition
1	Ayrshire	M	Gross ascites. Cystic right kidney	Oedematous	Hydrallantois
2	"	F	Cystic kidneys	"	"
3	"	M	Achondroplasia, ascites Cystic kidneys	"	"
4	Friesian	M & F	F—distorted limbs M—normal	"	Hydramnios
5	Guernsey	F	Slight cystic condition of the kidneys	Normal	Hydrallantois
6	Ayrshire	Twins Sex not recorded	One twin normal, the other grossly oedematous	Not recorded	Not recorded
7	Friesian	M & F	Normal	Oedematous	Not recorded

with Ayrshires second. There are only a few Channel Islanders. Of the seven cases of " hydrops " four were Ayrshires, two Friesians and one a Guernsey. The high proportion of Ayrshires is interesting in view of the findings of Donald, Deas & Wilson (1952) regarding the incidence of hydrops foetalis in this breed, though no firm conclusions can be drawn from such small numbers.

(b) *Sex of calves*

It is apparent that the sex of the calves is of no significance in cases of " hydrops " in the bovine.

(c) *Nature of the condition*

Of the five cases in which the nature of the condition was recorded, four were hydrallantois and only one hydramnios. This is remarkable in view of the fact that hydrallantois in the bovine receives scant attention in the literature, whilst there are numerous references to hydramnios. It would appear that hydrallantois in the cow occurs much more frequently than is generally recognised.

(d) *Twinning*

Williams (1943) comments on the prevalence of twin pregnancy in cases of hydramnios in the cow. This appears to be borne out in our cases, three of the seven being twin pregnancies.

(e) *Foetal membranes*

In five of the six cases in which the condition of the foetal membranes were recorded, they were markedly oedematous, but in one (Case 5) they were normal. Thus, although marked placental oedema commonly occurs in bovine " hydrops," it is not an essential feature of the disease.

(f) *Foetal abnormalities*

Several types of foetal abnormality were encountered on *post-mortem* examination of the calves, the most common being a cystic condition of the kidneys, sometimes associated with marked oedema and ascites. However, four of the 10 calves were normal. A discussion of the significance of these abnormalities is beyond the scope of this paper.

From this brief discussion it is clear that the condition loosely termed hydrops amnii in the bovine is not a single well-defined entity. The volume of foetal fluid, its site of accumulation and the time in gestation at which it becomes a clinical entity, the number of foetuses and whether they are normal or abnormal, and the degree of oedema, if any, of the foetal membranes are all variable factors. Nevertheless, the operation described can be performed in all cases with high expectancy of maternal recovery.

Summary

The surgical treatment of four cases of hydrallantois and one case of hydramnios in the bovine, is described and discussed.

Acknowledgments.—Two of the cases reported were operated upon by Professor J. G. Wright, D.SC., M.V.SC., F.R.C.V.S., for whose interest and advice in the preparation of this article the writer is deeply indebted. The writer also wishes to record his thanks to Mr. H. P. Harding, M.R.C.V.S., for the histological reports on the foetal kidneys, and to J. Y. F. Paterson, B.SC., PH.D., who carried out the biochemical estimations.

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The Treatment of Acute Lead Poisoning in Cattle with Calcium Versenate

BY
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J. C. MEIKLE
Reading

Introduction

THE occurrence of lead poisoning in farm animals is noted to-day in some areas with comparative infrequency, but there still are many sources of lead to which stock may gain access and the occasional manifestation of symptoms will be inevitable. For this reason it is felt that a brief description of the results of a specific therapeutic technique in cases of poisoning of this type might be of interest to readers.

History and Symptoms

A group of 10 pedigree maiden Jersey heifers, approximately 18 months of age, was turned out into a large field on the side of a hill. As far as could be ascertained no stock had been kept there for many years and no attempt had been made to cultivate and improve a very coarse pasture. Main water was supplied to a galvanised automatic tank by means of polythene tubing.

During a particularly hot spell of weather the animals spent much of the day sheltering under trees lining a banked path along one side of the field and, as was subsequently discovered, occupied their time by excavating in the bank. From beneath the tangle of undergrowth they unearthed old paint tins and builders' debris which must have been placed there years previously. Among the objects exposed was a large lump of congealed, white, lead paint in which tooth gouge-marks were found.

One of the authors (J.C.M.) was called to the farm on July 7th to see an acutely ill animal which was showing marked locomotor inco-ordination, appeared blind, and became very excited on being handled. Within half an hour it developed convulsive nervous spasms, fell over and died. Examination of the remainder of the group revealed another animal with signs of lassitude and slight inco-ordination. Blindness was also apparent.

A toxicological problem was suspected, and although a search of buildings and fields showed a variety of poisonous plants, the discovery of the builders' debris together with the symptoms described enabled a diagnosis of lead poisoning to be made. This was confirmed by *post-mortem* examination of the dead heifer, permitting chemical analysis of samples of kidney and liver submitted for examination.

Treatment

All the animals were confined in a covered yard and each was given three-quarters of a pound of magnesium sulphate. By the morning of July 8th, however, the second heifer mentioned above had developed acute symptoms and died. Three more animals were now exhibiting early signs as evinced chiefly by lassitude, blindness, and complete cessation of rumen and intestinal movement. One heifer showed excessive salivation and rapid cud-chewing jaw movements. Magnesium sulphate was again given to every animal.

At a second visit later the same day marked exacerbation of signs was noted, and all three affected animals were staggering and stumbling blindly in a circular fashion round the yard. At this point it was decided to obtain, if possible, a supply of calcium versenate,* but before the drug arrived on July 9th, one of the three heifers died and treatment was applied to the remaining pair.

Six g. calcium versenate in 500 c.c. glucose-saline solution were injected subcutaneously into two sites in one heifer. The other received 1½ g. intravenously, and 4½ g. subcutaneously diluted again in glucose-saline solution.

Excessive pain was caused by the subcutaneous injection and administration was completed with great difficulty because of the maniacal response of the patient. The intravenous injection produced no untoward signs of distress.

By the next day (July 10th) the heifer which had received the intravenous dose was clinically much improved though still blind. The other animal showed no change. Magnesium sulphate in ½-lb. daily doses was still being used and attention was paid to comfort and warmth in housing and forced feeding with gruels containing milk and eggs.

A visit on July 12th confirmed improvement in both animals, and although they still appeared to be blind, appetite had begun to return. Another intravenous injection of 6 g. of calcium versenate diluted in glucose-saline solution was given to both animals and recovery was rapid and uneventful. By July 24th both animals were clinically normal and returned to pasture. Vision appeared to have been restored completely.

No other animal developed clinical signs of poisoning and despite the pain caused by the subcutaneous injection, no tissue reaction occurred at the sites of administration of the drug.

Discussion

Various substances have been employed experimentally in cases of lead poisoning to combine with absorbed lead and facilitate excretion or deposition in bones as inert compounds. These included calcium preparations, citrates, dimercaptopropanol and others, but in the main they proved unsatisfactory because

*Riker Laboratories, Loughborough.

they were metabolised or excreted before complexing could occur at a therapeutic rate, or the lead compound formed was extremely toxic *per se*. The reports by Holm *et al* on the use of a new complexing agent in cases of lead poisoning in cattle (1953a) and horses (1953b) are therefore of special interest.

The substance known as calcium versenate, is the calcium disodium salt of ethylenediamine tetra-acetic acid (Ca EDTA) and has been employed successfully in human medicine as a complexing agent in connection with lead (Holm *et al* 1953b).

When Ca EDTA is administered to an animal in the presence of lead which is ionised or loosely adsorbed on to protein, the calcium in the molecule is replaced to form lead EDTA because of the greater stability constant of the latter. The compound thus formed is not ionisable at physiological *p*H and hence is non-toxic.

Holm *et al* (1953b) emphasise that Ca EDTA does not complex with lead from bony depots to any great extent. Its main effect is upon soft tissues and early treatment is likely, therefore, to inhibit deposition in bones.

The concurrent use of soluble sulphates by mouth to render inert the toxic lead material swallowed is essential.

Ideally the solution should be administered by the continuous intravenous drip (60 to 80 drops per min.) of a 2 per cent. solution based on the dosage of 1 gramme per 30lb. bodyweight. Using this same dosage Holm injected the material in divided amounts over the first 24 hours, but in the two cases described above the whole dose was given as one injection and repeated.

The frequency of dosage would depend to a marked degree upon the amount of lead absorbed and the period over which intoxication took place, but as peracute or acute poisoning form the types usually seen in cattle, the difficulties of repeated drug administration by intravenous injection are obviated by the demand for single full neutralising doses.

The production of great local pain at the site of the subcutaneous injection as described in Case 1, confirms the reference by Holm *et al* (1953a) to similar effects using 25 per cent. solution. Dilution of the drug did not seem to eliminate pain production and it is therefore considered that the route of administration should be by slow intravenous injection.

In view of the absence of information on the amount of lead swallowed it was impossible to compare the results obtained from the intravenous and subcutaneous routes of drug administration but the satisfactory response to treatment in both cases supports the findings of Holm *et al* and suggests that calcium versenate is likely to be of considerable value as a specific therapeutic agent in lead poisoning cases.

Summary

An account is given of the treatment of lead poisoning in two Jersey heifers using calcium versenate by subcutaneous and intravenous injection. Despite evidence of acute intoxication both animals recovered quickly and completely.

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Rupture of the Diaphragm in a Heifer

BY

P. J. DINGLE

East Rudham, Norfolk

THE subject was a three-year-old British Friesian heifer, about six months in calf, in a T.T. herd.

It was running out with a group of in-calf heifers and was noticed to be in poorer condition than the others and persistently blown. Actinobacillosis was suspected and treated with sulphamezathine and pot. iodide. There was no improvement and doses of ammon. carb. and nux vomica were also ineffective. According to the cowman, the tympany subsided only when the animal was kept in and practically starved, to return again after feeding. The appetite was poor but cudding was observed.

Gradually the clinical picture changed, and about six weeks later there was a definite accumulation of fluid in addition to the tympany, waves being felt on percussion of the abdomen. It was difficult to localise the position of this fluid. Puncture with a wide bore needle beneath the abdomen allowed a little straw-coloured fluid to escape from the left side, while, from the right, there was a darker, odourless fluid suggestive of uterine contents. On rectal examination it was found that the tympanitic stomach pushed aside the other viscera; the uterus had dropped and the calf could not be palpated. No definite diagnosis was made but hydrops amnii was now considered as a possibility. The owner was anxious to keep the animal until it calved, but, after a few weeks, it had difficulty in rising and was destroyed.

Post-mortem showed a rupture of the diaphragm on the right side close to the chest wall, with protrusion of the reticulum into the chest cavity. There was a little fluid in the abdomen but the vast bulk of the fluid was in the rumenal contents. These were much more liquid than normal and the rumen was greatly distended. The calf appeared normal and there was no excess fluid in the uterus.

It is rather surprising that there had been no distress in the animal's breathing, and it is difficult to see how the condition could be diagnosed except, possibly, by an exploratory rumenotomy. It is conceivable that the condition followed an acute attack of tympany especially if there had been bullying by the other heifers.

Acknowledgment.—My thanks are due to Mr. J. McLintock, M.R.C.V.S., D.V.S.M., for his interest and help in this case.

"THE RECORD"

We much regret that continuing difficulties in the printing trade have made it necessary to reduce this week's issue from the usual 40, to 36 pages. This has meant the omission of a number of news items, letters, and the Current Literature feature. The reduction is, however, considerably less than that suffered by many other journals.

News and Comment

THE HOUGHTON POULTRY RESEARCH STATION

At a press conference on Monday last, held at the Farmers' Club, London, the official announcement was made of a change in the status and management of what has been known hitherto as the Poultry Research Station of the Animal Health Trust. An announcement issued jointly by the Trust and the Agricultural Research Council stated :—

"The Animal Health Trust founded its Poultry Research Station at Houghton, Huntingdonshire, over seven years ago. Under the leadership of Dr. R. F. Gordon the staff of this centre has done much useful work on behalf of the poultry industry.

The Animal Health Trust recognised that in the interests of the industry this work should be developed on a scale beyond the means at the disposal of the Trust. At the same time the Agricultural Research Council were considering how best to meet the need for a substantial expansion of facilities for poultry research. Negotiations were therefore begun between the Trust and the Council to see whether the additional research facilities the Council had in mind could be provided by the expansion of the Trust's existing Station, rather than by establishing an entirely new institute. These negotiations have now resulted in an agreement for financial co-operation on lines which should satisfy the aims of both the Trust and the Council and meet the conditions essential to the provision of Government financial support.

Under these arrangements the Trust will contribute one-third of the net annual maintenance expenditure up to £10,000 a year and the Agricultural Research Council will contribute the other two-thirds, with freedom to each party to give more if they wish and if it is in the interests of the Station.

The Station is to have an independent status and will be known as The Houghton Poultry Research Station. It will be governed by a board of nine members who have been appointed by the Lord President of the Council, the Minister of Agriculture, Fisheries and Food and the Secretary of State for Scotland, three of them having been nominated by the Animal Health Trust. Of the nine members, four have been chosen for their knowledge of, or interest in, the poultry industry and the remainder are scientists. The membership of the governing body is as follows : Mr. T. H. Turney (Chairman), Professor E. C. Amoroso, B.SC., M.B., B.CH., B.A.O., PH.D., Mr. H. Finn, Mr. G. Guttridge, Mr. F. Grove, Professor K. Mather, D.SC., PH.D., F.R.S., Professor Lord Stamp, M.A., M.B., B.CHIR., Professor E. G. White, B.SC., PH.D., F.R.C.V.S., and Dr. W. R. Wooldridge, M.SC., M.R.C.V.S., F.R.I.C. This governing body will be responsible for administering the funds contributed by the Agricultural Research Council and the Animal Health Trust, subject to certain general supervisory powers to be exercised by the Agricultural Research Council. The status and functioning of the Station will be similar to that of the many other State-aided agricultural research institutes and it will continue as heretofore to maintain close contact with the industry through the medium of its consultative and diagnostic service."

In the course of a short speech to the Press representatives Dr. Wooldridge said that the same staff would continue to work under the same Director, Dr. R. F. Gordon, to whose work he paid warm tribute. He reminded those present of some of the principal lines of research and of practical poultry management that had been pursued since the Station's inception in 1948, papers upon which have been published in these columns from time to time.

In this connection he said : "Valuable work has been done on such ailments of chicks as coccidiosis and various salmonella conditions. A variety of nutritional problems have been investigated, and work begun on the dreaded fowl paralysis or lymphomatosis group of diseases. Some outstanding work has also been accomplished on fowl typhoid. In addition, such practical problems as hatchery hygiene and the sterilisation of egg surfaces as well as the problems associated with keeping hens on deep litter are being studied with, already, many beneficial results.

"Last, but not least, the whole technique of artificial insemination in poultry has been developed along practical lines and is steadily being improved by closer laboratory investigation. Already the technique is playing an important part in helping the intensive poultry keeper."

Mr. T. H. Turney spoke briefly, recalling that as early as 1938 an official body had recommended the setting up of just such a Station as the Trust had created 10 years later.

Dr. R. F. Gordon said the poultry industry owed to Dr. Wooldridge a deep debt of gratitude for founding the Poultry Research Station. Without his initiative the new arrangement, with its promise of still further essential service to the industry—whose annual loss from disease had been estimated at figures between £10,000,000 and £30,000,000—could not have been achieved.

THE SOUTH EASTERN VETERINARY ASSOCIATION

A pleasant informal dinner and social gathering was held by the Association on the evening of January 26th. A total of 51 members and their ladies sat down. Only two toasts were proposed, that to the Association by Professor L. P. Pugh and that to the ladies by Mr. S. L. Hignett. Responses were made by the President, Mr. P. M. Sutton, and by Mrs. Sutton.

During the course of the evening, a presentation was made of a wrist watch and gramophone records to the Honorary Secretary, for which he expressed his very sincere appreciation.

UNIVERSITY NEWS

Liverpool

The Senate of the University of London has conferred on Professor E. G. White the Degree of Doctor of Science for his work in the veterinary field.

He has also been appointed a Governor of the Houghton Poultry Research Station, some particulars of whose new constitution appear opposite.

Bristol

A Congregation for the Conferment of Degrees was held at Bristol University on January 20th. Five graduates were admitted to the degree of Bachelor of Veterinary Science, and Mr. R. N. Smith, M.R.C.V.S., Lecturer in Veterinary Anatomy, was admitted to the degree of Doctor of Philosophy. The title of his thesis was "Observations on the Ossification of the Appendicular Skeleton of the Sheep."

The Vice-Chancellor, Sir Philip Morris, congratulated the new graduates and spoke about the work they had done to earn their degrees and the work that still lay ahead. He emphasised the unique powers held by medical, dental, and veterinary graduates for inflicting suffering on man and his fellow-animals and urged them always to remain sympathetic human beings preserving the true humanitarian values.

Immediately afterwards a ceremony was held to admit the new veterinary graduates to Membership of the Royal College of Veterinary Surgeons. All Faculties of the University were represented. Professor C. W. Ottaway introduced the President, Mr. H. Sumner, and assured him of the regard of the Bristol Veterinary School for the Royal College. The President welcomed the graduates to the profession. He reminded them that although they were no longer students of the University they must always remain students of veterinary science. Finally he observed that as this was a young school they had the responsibility of building its traditions.

CONFERENCE OF VETERINARIANS AND SHEEP FARMERS

The Animal Health Division and the veterinary profession in Devon and Somerset have, in conjunction with the National Agricultural Advisory Service, arranged a full day's conference to consider some of the problems affecting the health and productivity of sheep. It will take place at the Town Hall, Dulverton, on February 8th. The discussion on each paper will be opened by a local veterinary surgeon and a local farmer. Time is allowed for general discussion and it is the hope of the organisers that as many farmers and veterinary surgeons as possible will take part in the discussion. The chairman will be Mr. G. C. White, J.P., Chairman of the Somerset County Agricultural Executive Committee. The programme is as follows:—

10.15 a.m.: "Some Metabolic and Deficiency Diseases of Sheep," by J. R. Holmes, M.V.SC., P.L.D., M.R.C.V.S., University of Bristol Veterinary School.

11.30 to 1.00 p.m.: "The Association between Pasture and Parasitic Disease," by E. L. Taylor, D.V.SC., M.R.C.V.S., D.V.H., Deputy Director, Ministry of Agriculture, Veterinary Laboratory, Weybridge.

2.15 p.m.: "Anaerobic Diseases of Sheep," by W. T. Rowlands, M.R.C.V.S., D.V.S.M., Veterinary Investigation Officer, Bangor, N. Wales.

3.30 p.m.: Summary of Conference, by D. W. Menzies, M.R.C.V.S., Superintending Veterinary Investigation Officer, Langford House, Langford, Bristol.

PERSONAL

Births

BENNETT.—On January 23rd, 1956, to Euronwy, wife of D. G. Bennett, M.R.C.V.S., of Mount Pleasant, Ross-on-Wye, a son, Robin, brother for Richard.

COID.—On January 21st, 1956, to Marjory, wife of C. R. Coid, B.SC., M.R.C.V.S., of Compton, Berks, a daughter.

CROOKS.—On January 22nd, 1956, to Heather, wife of J. L. Crooks, M.R.C.V.S., 28, Norwood, Beverley, a son.

MACLELLAN.—On January 20th, 1956, at the Rubislaw Nursing Home, Aberdeen, to Mayrine, wife of M. Maclellan, M.R.C.V.S., St. Kilda, Laurencekirk, a daughter—a sister for Joan and Alasdair.

Death

HARRIES.—On January 11th, 1956, after a long and severe illness, Mary Helen Harries (*née* Petheram) aged 39 years, beloved wife of L. G. Harries, B.SC., M.R.C.V.S., of Hilton, Upton-on-Severn, Worcs. She leaves three children, two girls and one boy, aged 12, 10 and 8.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

RIDER, Joseph William, 14, Ashtrees Gardens, Gateshead, Co. Durham. (Capt. late R.A.V.C.) Graduated New Edinburgh, May 30th, 1889. Died January 25th, 1956, aged 87 years.

COMING EVENTS

February

8th (Wed.). Meeting of the R.A.V.C. Division, B.V.A., at University of Cambridge, at 12 noon.

10th (Fri.). Annual Ball of the Glasgow University Veterinary Medical Association in the Rhul Restaurant, Sauchihall Street.

Annual General Meeting of the Yorkshire Division, B.V.A., in Leeds, 2.30 p.m.

14th (Tues.). Annual General Meeting of the Eastern Counties Division, B.V.A., at the Bell Hotel, Norwich, 11 a.m.

16th (Thurs.). Annual General Meeting of the South-Eastern Division, B.V.A., at the Royal Star Hotel, Maidstone, 2.30 p.m.

General Meeting of the Herts and Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

17th (Fri.). Annual Ball of the Royal (Dick) School of Veterinary Studies in the Assembly Rooms, George Street, Edinburgh, 8.30 p.m.

22nd (Wed.). Second Meeting of the A.V.T. and R.W's. Scottish Regional Group for the 1955-56 session in the Moredun Institute, Edinburgh, 2.15 p.m.

23rd (Thurs.). Meeting of the Essex Division, B.V.A., at the Essex Institute of Agriculture, Writtle, 7.30 p.m.

March

7th (Wed.). Annual General Meeting of the Scottish Metropolitan Division, B.V.A., at the Royal (Dick) School of Veterinary Studies, 3 p.m.

22nd (Thurs.). Spring Meeting of the North of Scotland Division, B.V.A., at the Northern Hotel, Aberdeen, 2.30 p.m.

April

4th, 5th and 6th (Wed., Thurs. and Fri.). B.V.A. Council and Committee Meetings, at Royal (Dick) School of Veterinary Studies, Edinburgh.

September

16th to 22nd (Sun. to Sat.). 74th B.V.A. Annual Congress at Royal Leamington Spa.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ches. Deva Hospital, Upton, Wirral (Jan. 26); Middlehurst Farm, Barrow, Chester (Jan. 30).

Cornwall. Penrose, Tregony (Jan. 30).

Cumberland. Raw Foot Farm, Gowerby Road, Castle Gowerby (Jan. 24).

Derby. Hollies Farm, Atlow, Ashbourne (Jan. 24); Glade Farm, Ticknall (Jan. 27); Carr Wood Farm, Brackenfield; 42, Woodlands Road, Stanton, Burton-on-Trent.

Durham. Morton Hall Farm, Wingate (Jan. 25); Darlington Corporation Abattoir, Park Lane, Darlington (Jan. 26); Click-em-in Farm, Quebec (Jan. 27).

Kirkcudbright. Hough Mile Farm, Hough of Lin, Castle Douglas (Jan. 24).

Leics. Hill Top Farm, Marefield, Tilton (Jan. 25); Trent Lane Farm, Castle Donington (Jan. 26).

Lincs. Church Farm, Manthorpe, Grantham (Jan. 25).

Norfolk. Cropton Hall, Heydon, Norwich (Jan. 28); Pound Farm, North Tuddenham, Dereham (Jan. 30).

Northumberland. High Eshalls Farm, Hexham (Jan. 25).

Notts. Village Farm, Owthorpe (Jan. 25); School Lane Farm, Colston Bassett (Jan. 28).

Warwicks. The Lilacs, Main Road, Mowsley, Rugby (Jan. 26).

Wilts. Manor Farm, Steeple Langford, Salisbury (Jan. 27).

Yorks. Ladgate Farm, Brotton, Saltburn by Sea; North Farm, North Street, Aldbrough; Low Gill Farm, Aggletherpe, Lyeburn; Crosskeys Farm, Borrowby, Thirks (Jan. 25); Middle Dale, Market Weighton; The Homestead, Humbleton, Selby; White House Farm, Oakenshaw, Bradford, Grange Farm, High Birstwith, Harrogate; White Hill Farm, Haverah Park, Beckwithshaw, Harrogate (Jan. 26); Burnsall Farm, Staithes Road, Preston, Hull; East End Farm, Everthorpe, Brough; Castle Rise, Castle Road, Cotingham; Manor Farm, Newbald; Prospect Farm, Suffield Hill, Scalby, Scarborough; Levanhill Farm, Wykeham; Home Farm, Sharow, Ripon (Jan. 27); The Hall, East Layton, Richmond; Park House Farm, Liverton, Loftus, Saltburn-by-Sea,; North Street, Aldborough; Halsham Hall Halsham, Hull; South Farm, Easington, Hull; 23, Church Street, Owston Ferry (Jan. 28); Slaughterhouse, Beverley Road, Woodmansey, Beverley; Southlands Farm, Halsham, Hull; Model Farm, Weeton, Brough; Foxhouse Farm, Drewton, South Cave, Brough; Middle Farm, Little Hatfield; York Road Allotments, Ricall; Beech Farm, Hive, Gilberdyke; Throstle Nest Farm, Harmby, Leyburn; Apple Tree House Farm, West Scrapton, Leyburn; Village Farm, Newton Mulgrave, Hinderwell, Saltburn-by-Sea; Barolin Farm, Markington, Harrogate; Folly Gill Farm, Darley, Harrogate; Manor Farm, Edenthorpe, Doncaster (Jan. 30).

Fowl Pest

Berks. 341, Finchampstead Road, Wokingham (Jan. 24).

Ches. Woolfall Farm, Hankelow, Crewe (Jan. 26); Ivy House Farm, Hankelow (Jan. 27).

Essex. 9, Accommodation Road, Boxted, Colchester (Jan. 25); Grove Farm, Sandon, Chelmsford; 41, Straight Road, Boxted, Colchester (Jan. 26); 43, Straight Road, Boxted, Colchester (Jan. 28).

Monmouth. Little Craig, Cross Ash, Abergavenny (Jan. 28).

Norfolk. Rectory Road, Wood Norton, Dereham (Jan. 25).

Northants. 24, South Street, Isham, Kettering (Jan. 30).

Swine Fever

Bucks. Bisham Abbey Farm, Bisham, Marlow (Jan. 26).

Dorset. Potterne Pig Farm, Verwood, Wimborne (Jan. 25).

Hants. Colbury Cottage, Pound Lane, Totton, Southampton (Jan. 24); Rose Cottage, Burley Street, Burley, Ringwood; Stocks Farm, Burley (Jan. 30).

Kent. The Piggeries, Lower Road, East Farleigh, Maidstone (Jan. 24).

Lancs. Lane Head Farm, N.2 Oldham (Jan. 26); Whinney Cottage, Whinneyfield Lane, Wood Plumpton, Preston (Jan. 27).

Yorks. Star Carr Farm, Haxey, Doncaster (Jan. 25); Killingraves, Bishop Burton, Beverley (Jan. 26).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

The Use of "Xylotox"

Sir,—In fairness to the use of "Xylotox" as a local anaesthetic in animal castration, I feel bound to report a second instance in my practice of fatal internal haemorrhage in a yearling pony colt after the operation.

The animal was one of five I operated on one morning taking particular care to compress the artery for nearly one minute and using no local anaesthetic. The subject, a nondescript pony type, was found dead next morning, and autopsy showed a fatal haemorrhage into the abdominal cavity from one retracted spermatic artery.

The occurrence of these two cases so close together, after a lifetime of freedom from this class of accident, appears to be just an odd coincidence but actually may be due to the far greater number of nondescript pony types now being bred in Tasmania.

As, I believe, elsewhere, there has been a great increase in Tasmania in juvenile equitation causing a brisk demand for almost any sort of pony or small horse. In consequence, most of the animals presented for castration are in this category. It may well be that such nondescript pony colts are more liable than Draughts or Thoroughbreds to retract the spermatic artery into the abdominal cavity after operation.

In addition to my own two fatalities, I have heard of at least four others occurring in Northern Tasmania in the last year or two. Thus I should be grateful to learn from colleagues in Britain and Ireland whether some of the newer forms of catgut ligatures can now be applied to the spermatic artery

in an open operation without much, or any, risk of the scirrhous cord we used to dread.

If so, I would certainly ligature the spermatic artery in future castrations of mixed-breed ponies in my Tasmanian practice, because few things worry the careful clinician more than to lose cases from haemorrhage that could have been prevented.

In one's early days, using the actual cautery, such fatalities were virtually unknown, but with modern methods such as the emasculator it appears that there is a definite and perhaps an increasing risk which we should co-operate to overcome.

J. W. RAINEY.

P.O. Box 141,
Westbury,
Tasmania.

January 14th, 1956.

Replies to Advertisements

Sir,—I am surprised and somewhat dismayed at the lack of good manners shown by a few members towards their professional colleagues.

Surely on receiving an answer to an advertisement in THE RECORD not one of us is too busy to acknowledge receipt, even if time and circumstances do not permit a full reply?

Further, this criticism might well be taken to heart by some organising and administrative bodies to which many of us pay an annual subscription.

Yours faithfully,

C. L. E. HAMBROOK.

7, Harvey's Lane,
Launceston,
Cornwall.

December 22nd, 1955.

The Natural Order

Sir,—I recently received a Government pamphlet outlining, in those terms of bureaucratic omniscience with which we are all too familiar nowadays, my rights and duties as a landowner in connection with the scheme for the total eradication of the wild rabbit in this country.

Now it seems to me that the decision to eradicate completely a species of animal which has inhabited the British Isles for many centuries without disastrous effects upon the human inhabitants brings up moral and ecological issues of the profoundest importance, and we of the veterinary profession who spend our lives in such close association with animals cannot feel that our responsibility ends with the domestic species.

Where is this policy of insensate slaughter going to end? Already the fox, grey squirrel and wood pigeon are mentioned openly as being the next for the "final solution." Agitation for the removal of the buzzard and golden eagle from the list of protected birds is becoming more insistent. The persecution of our badgers, otters, polecats, martens, deer and wild cats will prove beyond endurance. At our present rate of "progress" I predict that in our own lifetime it will be discovered that the thrush and blackbird are a grave menace to our economy and cannot be ignored by the Government.

For millions of years before man appeared on the scene the profound natural order had been working so that it was possible for an even greater variety of living things to inhabit the earth in enough harmony to maintain the fertility necessary to keep the cycle going. It is only of very recent date that the species *Homo sapiens* has shown signs of finding it impossible to harmonise either with his own kind or with other living things and has started squandering world resources and power in a wholly destructive way. The result is a desperately unbalanced natural order and a very unhappy and fearful *Homo sapiens*.

I maintain that the only way for man to gain some measure of peace and hope is for him to feel once more that he belongs to the natural order, is working with it, and is not out to conquer it.

Yours faithfully,

"Newgate,"
Llanbrynmair,
Mont.

F. B. EDWARDS.

January 14th, 1956.

Encephalitis and Cerebro-Spinal Fluid

Sir,—I have been reading with interest the comments of Mr. Carter and Mr. J. K. Bateman, and hope that the observations I make in the following few paragraphs may be of some assistance.

In the past four years I have done a large number of sub-occipital punctures for the withdrawal of canine cerebro-spinal fluid, and have done a sufficient number of normal dogs, as well as dogs with encephalitis, to make a statistically valid comparison. It is my firm belief that encephalitis is not augmented by an increase of C.S.F. pressure. In 21 normal dogs we found the pressure to average 86.1 mm.; in 29 dogs showing various forms of encephalitis and other encephalopathy, the average was 82.9 mm. The range of pressures in these groups varied in the normals from 40 to 145 mm. and 40 to 255 mm. in the neurological cases. Since the average was very similar to those of the normal dogs I do not think that the upper range of pressures is significant for encephalitis.

Our method of determining pressure was by using the Ayer Manometer similar to the "rising tube" described by Lups & Haan. It has been repeatedly shown that the C.S.F. pressure can be markedly raised for varying periods of time without any noticeable irritation of the brain. As for the amount of C.S.F. that can be readily withdrawn, we have found that the quantity is in direct proportion to the size of the animal, varying from 3 to 20 c.c. and is fairly consistent. No increase of C.S.F. has been noted in cases of encephalitis. In several cases we have made repeated punctures and the only effect has been one of a slightly increased white cell count, a slight increase in protein and an increase of the mid-zone of the gold curve. This has been true of normal dogs as well as cases of encephalitis. I firmly believe that there are a number of causes of encephalitis in

dogs, and that the examination of the C.S.F. in regards to protein, cells and gold curve, may finally lead to a means of differentiation. As far as treatment, I think that release of C.S.F. pressure is fruitless.

Sincerely yours,

MARCUS M. MASON.

20, Harvard Street,
Worcester, 2,
Massachusetts,
U.S.A.

January 14th, 1956.

Reference

LUPS, S., & HAAN, A. M. F. H. (1954). *The Cerebrospinal Fluid*, Elsevier Publishing Company, Amsterdam.

Echinococcus Infection in the Fox

Sir,—The recent paper by Miller & Poynter (1956) prompted me to report some observations concerning the incidence of *Echinococcus granulosus* in this area. Hydatids are not uncommon in the lungs and liver of animals slaughtered for food and I have heard from butchers working in knackeries that cysts in the livers of horses are of "fairly frequent" occurrence. During the early months of 1955, I carried out *post-mortem* examination of eight foxes killed in Cardiganshire. Five were infected with *E. granulosus* and in one case 64 specimens were found. With the co-operation of the Forestry Commisson and the county agricultural executive committees it is hoped this year to examine a larger number of foxes from a wider area. To date, eight foxes have been received and *E. granulosus* found in one. Two of these foxes were killed in Cardiganshire and both were found to be free from infection. Unfortunately, it is only about lambing time that farmers become interested, so that organised shoots have not yet commenced.

It is possible that the most important intermediate host of *E. granulosus* is a small herbivore such as the rabbit and hare, and infection of larger animals is more or less accidental. Myxomatosis was widespread in Cardiganshire during 1954 and the rabbit population appeared to have been wiped out by the end of that year. There is no doubt that rabbits form part of the diet of foxes and, incidentally, in country districts, of some dogs as well. If the above theory is correct, the outbreak of myxomatosis should be reflected in a reduction of the incidence of *E. granulosus* in foxes, and, in turn, hydatid disease in other animals.

Yours faithfully,

K. B. SINCLAIR.

University College of Wales,
Dairy Buildings,
Llanbadarn Road,
Aberystwyth.

January 23rd, 1956.

Reference

MILLER, W. C., & POYNTER, D. (1956). *Vet. Rec.* **68**. 51.

Hydatid Disease

Sir,—In their interesting article dealing with hydatid disease in a Thoroughbred mare, Miller & Poynter (1956) refer to the paucity of records of the disease in equines in Great Britain in recent years.

To-day, January 23rd, 1956, at a horse abattoir in Northern Ireland, 28 horses were slaughtered for human consumption and of these, seven were found to be affected with hydatidosis. In every case the liver was the only affected organ. One liver showed many small cysts the size of lentils. Two had several large unilocular cysts, up to the size of a hen's egg, both on the surface and deep in the tissue. The remaining four livers did not exhibit cysts but showed thin (one-tenth of an inch) streaks of caseated and calcified tissue raised slightly above the surface. In these degenerated lesions typical hooks were demonstrated microscopically in the debris. In the other cysts brood capsules, scolices or hooks were seen.

Another type of hepatic hydatidosis is occasionally encountered in horses slaughtered here. Such a liver shows few surface cysts although they occur deep in the organ as large, fluid-filled sacs with incomplete internal septae. Microscopically brood capsules and scolices are demonstrated. More in evidence are large areas of the liver, both deep and superficial, which are markedly fibrosed and apparently tending towards calcification. The affected tissue is yellow-grey in colour and on incision is seen to be arranged like an irregular honeycomb with large "cells." Little fluid is present in the honeycombs and scolices are not found. This type of multilocular hydatid cyst is commonest in man but occurs occasionally in the ox and pig whereas the simple unilocular cyst is the commonest type in the horse (Thornton, 1949).

Our seven diagnosed cases in 28 horses gives a percentage of 25. However, this should not be taken as the true over-all incidence as over the year a figure much less than this is obtained.

It is intended at a later date to publish fuller data on the incidence of the disease as seen in Northern Ireland but we feel the facts we have stated show the condition to be much more prevalent than is generally believed.

Yours faithfully,

J. T. BAXTER,
Veterinary Research Division.

W. O. HARPER,

D. BELL,
Veterinary Division.

Ministry of Agriculture,
Stormont,
Belfast.

January 23rd, 1956.

References

MILLER, W. C., & POYNTER, D. (1956). *Vet. Rec.* **68**. 51-3.
THORNTON, H. (1949). "Text-book of Meat Inspection," p. 389.